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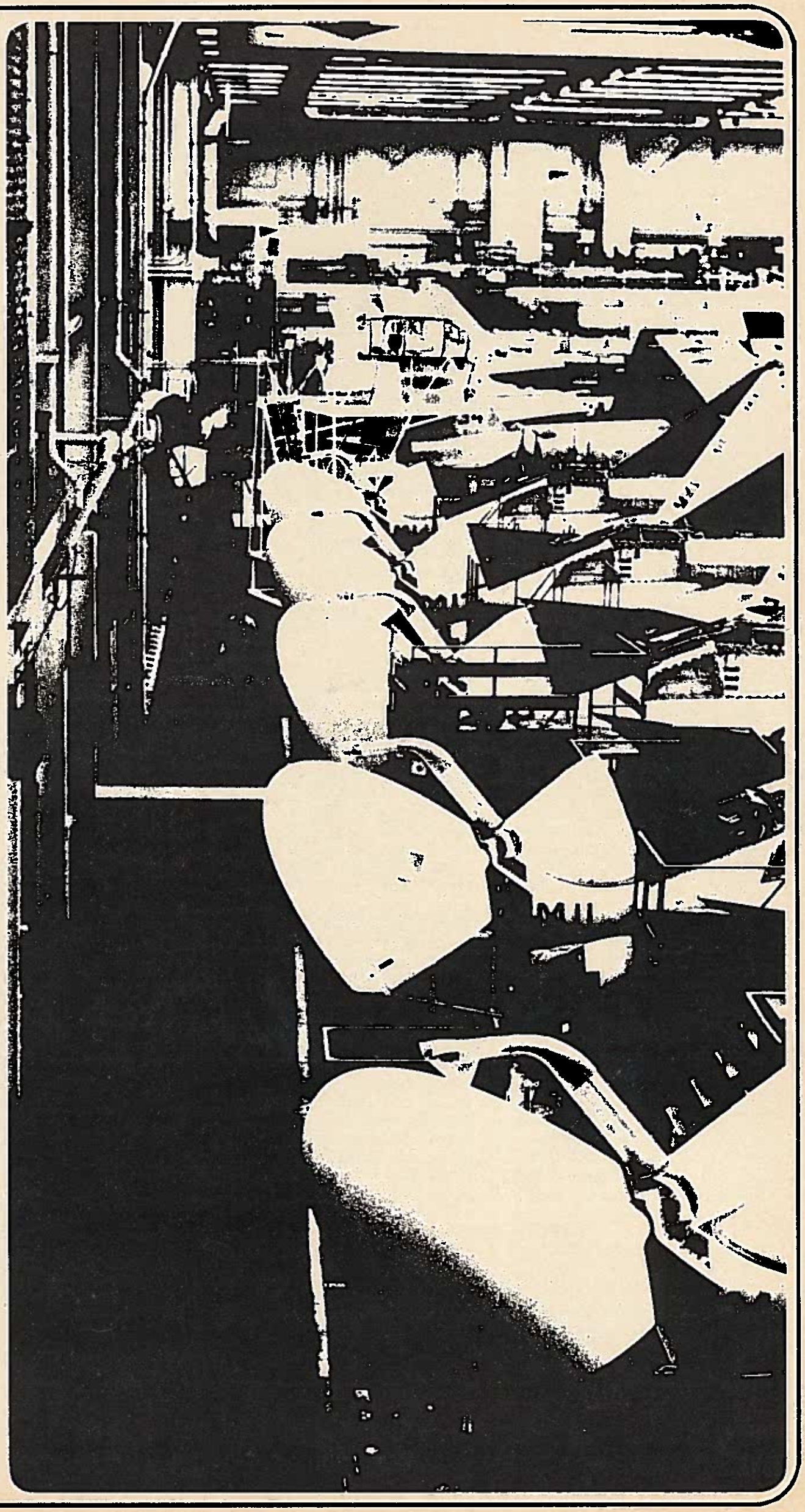
Calverton— Where the crunch comes



What a difference a year makes . . .

In January of 1972 there were 11 aircraft in flow at Calverton's Plant 6: five EA-6B Prowlers, four A-6E Intruders, and two F-14 Tomcats. In the first month of this year there were four EA-6Bs, four A-6Es, 13 A-6As being modified to A-6Es, and 13 F-14s in flow . . . 11 aircraft versus 34. And during the course of the year, one more EA-6B and two more F-14s are to be added to the workflow each month, raising the total to 37.

The floor is again covered with aircraft and engines, as it was in the mid-sixties.

That's one measure of how things are going. Another is quite different: the symphony or cacaphony (depending on one's otulook) at Plant 6. Some call it a House of Sounds—the banging of hard rubber against metal, the whirring of an electric sander being used to clean a pylon, the zzzzzt of driving in rivets, the rumbling of overhead traveling cranes, the muted hissing of air hoses, the soft rattling of carts carrying materials, the punctuated voicings from the public address system . . . sounds all meshing weirdly . . . and after "living" there, you're aware of the rhythms that almost take on the aspect of quietness. Almost.

Not really, of course, because at the start in prejoining and joining, through all of the installation steps, and finally at engine run and painting, there are sounds of putting an aircraft together. More important, in any event, is action—the workflow. Although there is no assembly line in the sense of an automated procedure—such as in the bottling of soft drinks—there is and has to be a prescribed routing, station by station. And there's a time-line too. In fact, that line is one of the most significant features in determining the progress of workflow; and involved in that, too, are the cost factors that can be read as efficiency or productivity or cost-effectiveness. All that probably boils down to doing a quality job within cost and on (or ahead of) schedule. That's "the name of the game" and the approximately 700 people in Plant 6 are acutely aware of it.

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Tomcat in 'shootout' with F-4

"Yesterday afternoon No. 8 F-14 was matched against an F-4J with fixed leading edge slats in eight pre-briefed encounters."

So begins a report by Grumman Chief Test Pilot Chuck Sewell about a "fly-off" to settle the issue of which plane, the Tomcat or an enhanced. Phantom, was the better. The fly-off was directed by the Navy.

Sewell piloted the Tomcat and Cdr. George White of the Flight Test Division at the Naval Air Test Center, Patuxent River, Md., was in the back seat serving as referee. The Phantom was flown by Lt. Dave Walker, NATC project pilot for the aircraft.

Results? Sewell captures it in one laconic sentence:

"The F-14 controlled the 'fight' at all times and was the winner eight out of eight times."

This flight competition takes on added significance in that the F-14A had neither maneuver slats nor were maneuver flaps used. They just weren't needed.

The first of the eight flight engagements began at 35,000 feet at 1.5 Mach "with the F-14 in the lead and the F-4J 1,000 feet astern. Starting conditions for the remainder of the runs varied on down to .6M at 18,000 feet with the airplanes alternating lead an trail positions," Sewell recounts. And he says that "In all cases, the F-14A was capable of tracking the slatted wing F-4J through its maximum performance turns down to the point where evasive action had to be taken to avoid collision. A high 'yo-yo' (moving up then down in a vertical plane) at this time, coupled with the good turning radius of the F-14A, brought the F-14A back into tracking position."

Although neither the F-14 nor the F-4J carried any weapons, it was reported that both planes were at "combat weight." And when the fly-off was over, Sewell wrote: "The F-14A performance in the air combat maneuvering arena is truly impressive, to say the least."

Keeps 'em flying. In order to assure the complex electronic counter-measures EA-6B aircraft is on duty for maximum time, Grumman has developed a computer-controlled system for testing many black boxes: a Digital Test Station. It can do the job using just 10 feet of deck space. (Photo by Harry Prodromides)

DTS helping Prowler run interference for Fleet's air arm

What do you do when the EA-6B Prowler, the Navy's most advanced electronic counter-measures (ECM) aircraft, flies back from a mission and you learn that something is wrong, somewhere, in the electronics systems?

The easy answer is to have the BIT (Built In Test) take a look at the problem; and that's what happens. If the BIT tells you that the trouble is in one of the 14 specific boxes, the faulty box goes to the Digital Test Station. But that simple solution can be highly deceiving if you don't have some notion of what the Prowler is, what it can do, and what the DTS is . . . and how the DTS works.

Broadly speaking, the Prowler's job is to run electronic interference for Fleet aircraft by rendering enemy radar useless. That is, the Prowler prevents the enemy from locking on to our aircraft. It jams (blots out) enemy radars or deceives them by projecting false targets, thus nullifying the effect of enemy aircraft and missiles. That clears the way for our offensive airborne action.

So, when a Prowler loses any of its capabilities, the dangers to Fleet aircraft increase, and the Prowler's effectiveness has to be restored as soon as possible. To help tackle that highly complex task, Grumman has designed, developed, and produced the DTS.

"It required about 47 months of work by some 150 to 200 people—Product Support engineers, GDS programmers, Production, and Material people — to complete the job," says Chief Engineer Ray Doll of P/S. "Four of the stations have been sold so far, another is in final sell-off, and inquiries lead us to believe that more are in the offing."

Computer controlled

Vic Bloom, P/S senior group leader on the DTS, sheds some light on what it's all about:

"The DTS is a computer-controlled system for testing many of the more complex black boxes, and it stores its tests on magnetic tape. The controller section, which contains these elements, is a separate unit two feet long and six feet tall. That unit runs the Test Console, which is eight feet long. As a result of the compact construction the station can be deployed aboard ship, where space is a critical factor."

The DTS provides a flexible array of black-box inputs and can display an equally flexible array of outputs. Because it is not tailored to any one box, it can test 14 different ARAs (Aircraft Replaceable Assemblies, which are black boxes) in just ten feet of deck space. The EA-6B aircraft is going through a big updating program (Expanded Capability) featuring these new ARAs plus modifications to the old ones. When these new equipments come along, the DTS will be able to handle them.

The ARAs supported by the DTS include a complex IBM computer, a very precise analog-to-digital converter, a large broadside computer interface unit, and many other technical units.

Now: what happens?

Well, to find out where the problem has occurred, a black box is put on a work tray and connected to the cables and connections in the DTS. The black box (each with a code number) is then programmed through the tests the operator selects, usually automatically. Push a button and the test starts . . . and it will run until it bumps into the "offending" card, where the fault is. At that juncture, there's a read-out: "See Instructions," which is shown on the operator's check list. So you replace the card and go back to the beginning and run the test all the way through to make certain that everything is running properly. The test, beginning to end, can last only about 15 minutes—an astonishingly short period of time when you consider the large number of individual microminiaturized parts involved. (And it should be said that though 15-minute tests are usual for the computer, some can run an hour or more.)

Naturally, packaging of the mircominiature elements in the DTS is dense, containing more than 500 printed circuit cards, over 11,000 solid state components, and 35,000 feet or more of wire—enough for an EA-6B and a half! Yet, with built-in-test capability, *the station can trouble-shoot itself down to the card level, usually automatically.*

Because of the use of a broad range of components, hardware designers led by Ron Kudla of Digital Engineering, with Phil Kiburis and Vic Interlandi of E/M Design, were able to package it in just 10 feet of space, and with a maintainability feature in which 98 percent of all sub-assemblies plug in!

Now in service

But the digital requirements are only half the job. As Ed Kovacs, the engineer responsible for overall systems design, puts it, "The critical analog and servo requirements also necessitated very talented engineering to accomplish."

In addition, there was the software job: programs that have to be written and put into a computer to control the console's testing. The Test Analysis and Design group under Owen Pettit (and later, Tom Soo) did that by using a Grumman-developed computer language and by producing over 200,000 punched cards and computer print-outs. In the end, it all boiled down to a single reel of magnetic tape. One DTS based at Cubi Point in the Philippines is being used to help keep three Prowler squadrons operational. Grumman Field Rep Jim McElroy is assisting the Navy to operate this unit. Another is at Whidbey Island NAS, Washington, where Frank Votry is assisting in Navy training.

Report from Pt. Mugu: Prep F-14 for BIS trials

Weapons system BIS (Board of Inspection and Survey) trials for the Tomcat are immediately around the corner at the U.S. Navy's Pacific Missile Range at Point Mugu, Calif.

Because of the earlier success of the first NPE (Navy Preliminary Evaluation) at Mugu, the Navy decided to skip NPE 3 and set up an ITP (Initial Trials Phase), which began last December and is now ending. The next step is BIS, an operation "during which a Navy team flying four Tomcats undertakes the task of evaluating all weapons system demonstration data to determine aircraft and weapons system readiness for Fleet delivery," says Tom Brancati, who heads the Grumman team at Mugu.

"It's the F-14's report card," Brancati says.

Tomcat's "grades" will take some five months to ascertain.

In capsule, the BIS trials are necessary to (1) verify that the weapons system can be operated safely by Navy crews, consistent with contract design limits; (2) assess the military potential and operability of new and updated systems; (3) permit early decisions on systems characteristics; and (4) make certain that the F-14 aircraft avionic and logistic support systems are fully integrated and operationally acceptable for deployment.

Armament tests

The flight tests will embrace the entire weapons system, including the use of Phoenix, Sparrow, and Sidewinder missiles, and the M-1 cannon. All of the missiles have been fired successfully—and, in fact, not long ago, four Phoenix missiles were fired in rapid succession at five targets, and the result was four "kills." As described by the program office at Mugu, "The F-14, laying back approximately 35 miles, was able to search through the attack force of five drones, identify and track approaching 'enemy' aircraft, and then take necessary action to select and destroy the oncoming enemy targets."

According to Art Karle, Grumman's Engineering manager at Mugu, "Much of our success in performance and in meeting the BIS schedule can be attributed to SITS (Systems Integration Test Station), a static vehicle used to integrate avionic systems. The task was complex because of the many individual units that had to become one. All of these units had to perform as a weapons system—for example, to 'talk' to one another, to keep the crew informed of their particular environment, and to deliver weapons."

What it takes. It's a fair sized gang that's needed at Point Mugu to take care of weapons loading/armament system evaluation for the Tomcat, as you can see. (L to R) Standing are Fred Black of Grumman F-14 Program management; Lt. Cdr. S. Schmitt, Navy Evaluation team leader; Jim McClelland and Emery Fischer of armament design; Clyde Cain of Field Service; Bill Ackerman of armament services; Frank Langdon and Rita Ferber of Field Service; and George Potter, Al LoDuca, and Charlie Kerrigan of Product Support. Kneeling are Nick Stratakis of Product Support, Ed Abernathy of Configuation Management; and Tom Vaught of Product Support. Not in the vicinity at photo time were Dom Pesce of weapons rail design, Syl Rocchio of armament systems, Don Broggini of Product Support, Joe Pusateri of pylon design, and Karl Christenson of armament systems.

'Right to be proud'

Brancati says that "A lot of long, steady, hard work went into getting the job done and done well. Our people have a right to be proud."

A somewhat similar effort is continuing on the East Coast where the production tempo is increasing. Test Pilot Charlie Brown, for example, quite recently took up Tomcat No. 25 on its first flight. Tomcat 1-X is now filling out the final portions of the flight envelope, No. 2 is doing high angle of attack work in several configurations, No. 3 is filling out the G envelope (6½ G at Mach 2 at 50,000 feet, and 6½ G at 250 knots), and so on.

Bob Smyth, deputy director of Flight Acceptance, says "We're getting closer to BIS trials at the Naval Air Test Center at Pax (Patuxent) River, Md. We're in good shape."

Ecosystems acquires two pollution control firms

Grumman Ecosystems, Inc., the Grumman Corporation subsidiary that specializes in pollution control and environmental assessment, has recently acquired two subsidiaries: Scientific Ecology Inc. and Power-Pac Enterprises Inc. Both firms are specialists in the fields of solid and air waste treatment.

"These two acquisitions, along with our other subsidiary, Puritech Industries Inc.," says Grumman Ecosystems' Executive Vice President Bill Schwendler Jr., "now give us the needed capabilities for penetrating all three of the major pollution control areas: air, water, and solid waste treatment."

Scientific Ecology designs and constructs various kinds of solid and air waste treatment facilities, including installations for municipalities, hospitals, apartments and industrial companies. Power-Pac Enterprises manufactures a series of refractory incinerator chimneys and rubbish chutes.

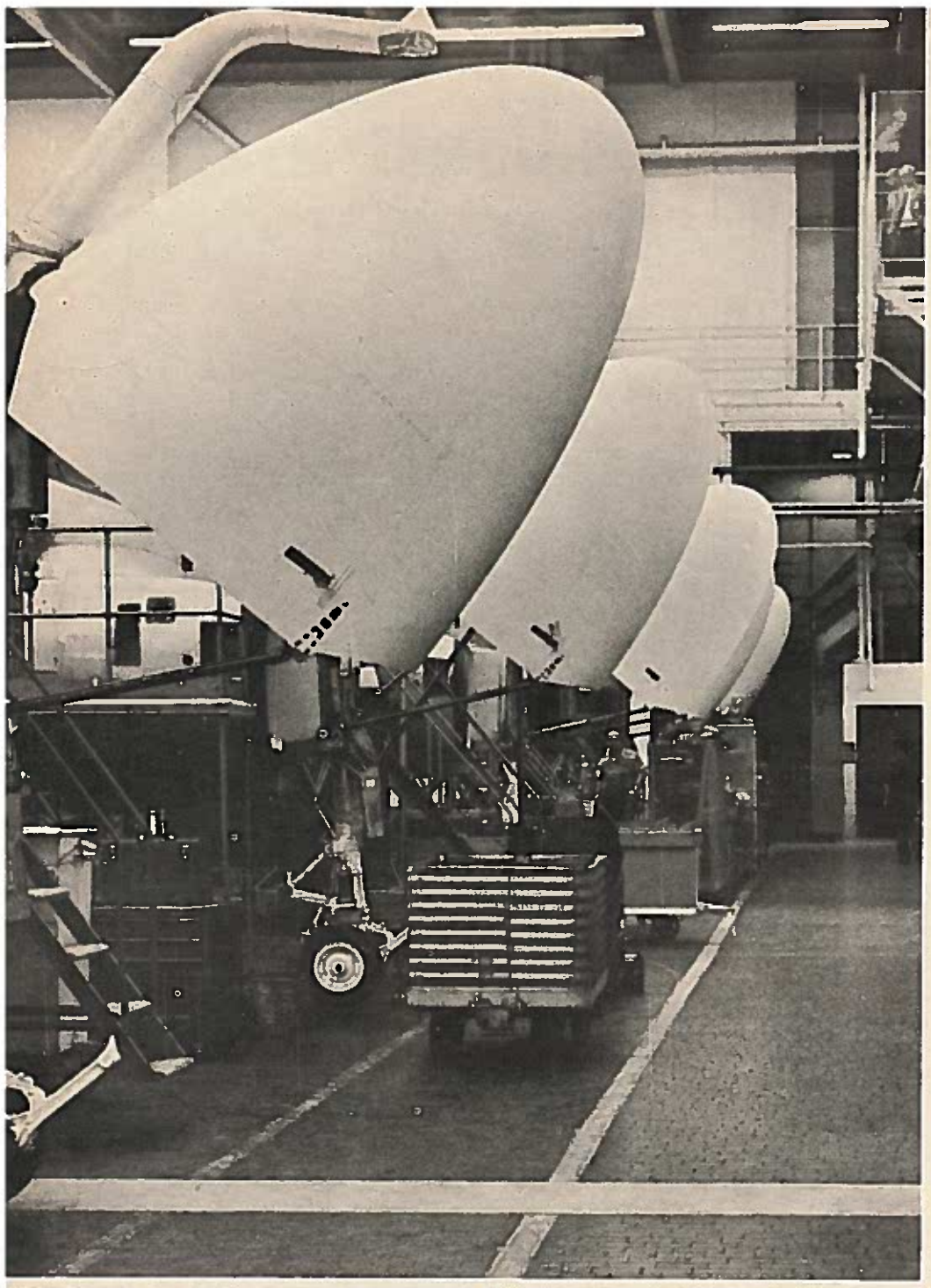
Both subsidiaries are now headquartered with Ecosystems in the Grumman Data Systems Center on Stewart Ave. in Bethpage.

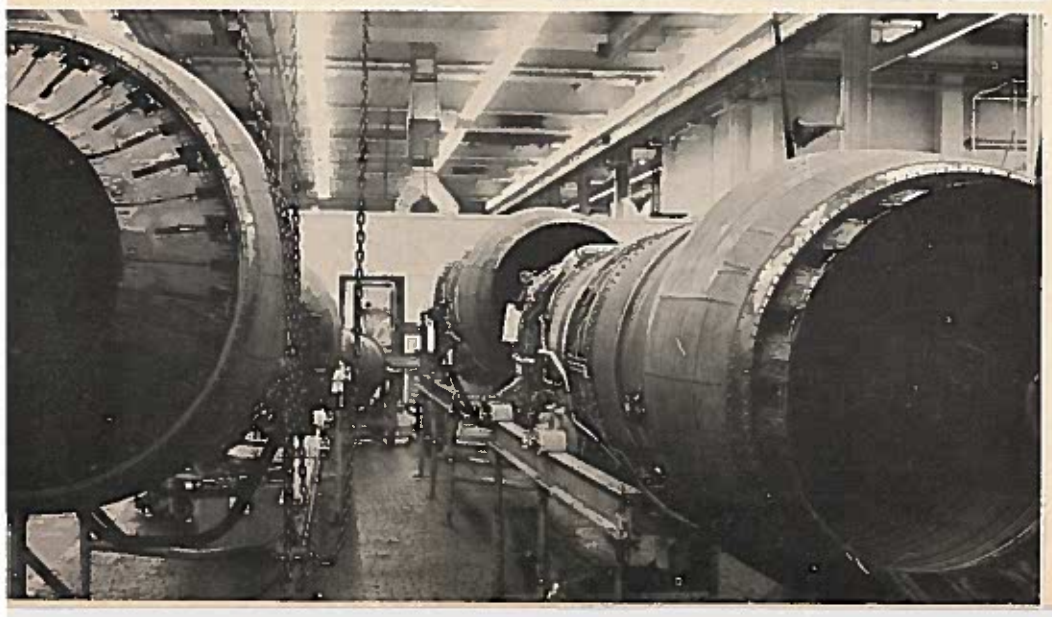
Some catchin' up to do. Three former POWs, Captains Harry Jenkins, Howard Rutledge, and James Stockdale, are shown examining newest Navy fighter, the Grumman Tomcat, during a chat with Vice Adm. Tom Walker (2nd R), Commander Air Force, Pacific Fleet.

Help Mike smile a lot . . .

That time's getting close, says Mike Cherry, who is directing the GAA membership campaign again this year. The drive ends on March 30, so if you haven't purchased your $1 GAA ticket for 1973, better hurry up. Your buck helps support many lunchtime and after-hours recreational activities — softball, ping pong, golf, etc.—and also helps many clubs meet some of their financial expenditures.

If you want to help put a smile on Mike's face, break loose with a buck, give it to your department clerk or administrator, and get your GAA ticket. You might also win one of the 15 Kodak pocket Instamatic cameras or one of 50 sets of Grumman glasses.





At Calverton— Final assembly real key to production

(Continued from page 1)

The production flow at 6 begins with what's called pre-joining, as explained by Allen McCaffery, lead man on A-6E:

"We receive the forward, aft, and center sections from Bethpage and have to get them into condition for joining. For example, on the forward section we work on the fuel line, the nose wheel wells (left and right), the keel, removal of the top deck and installation of fuel cells, close the top deck, and installation of the throttle control in the cockpit. It's that kind of effort."

And when "that effort" is cleared away, there's drilling, reaming, and riveting; and overhead cranes move each section into place. "For the A-6E," McCaffery says, "that involves some 7,000 pieces of hardware and the drilling of about 3,000 additional holes."

Joe Keller, who's a key man on A-6, says that once the three sections have been joined "we have to stuff the aircraft, putting in all sorts of lines—electrical, environmental control systems, fuel and hydraulic—and valves and structures. You just move it along bit by bit, station by station. The men at each station know what has to be done before the plane moves to the next station. All the kits—the parts required to do the job—are to be at the right spot at the right time."

'Where the pressure is'

This can be one of the tougher parts of the job, for the people at Plant 6 have to rely on the on-time arrival of software and hardware; otherwise there's a lag or a stop. The significance of all that strikes Paul Butler, director of Calverton Operations, as being *the* critical area in the production process. As he phrases it:

"Final assembly is the real key to production, where everything has to inter-relate smoothly and efficiently if aircraft are to be delivered on time and within cost. That's where the pressure is because it's the end of the line. You haven't the luxury of being able to transfer problems and work to other plants."

Stan Wiercinski, who's general manager of Manufacturing for plants 6, 7, and 8, says that "This is where the crunch comes. Whatever hasn't been done earlier has to be done here. Sure, sometimes there's a little leeway in the production line, where a minor part or process can be overlooked for a brief period without interrupting workflow. But that doesn't happen often. It can't. Things get tighter and tighter as you move toward the door to get a plane out and over to Plant 7 for flight test."

The whole effort, of course, is pointed toward that door, so there's a lot of action around the place. "But it's directed," points out Frank Leone, manager of Plant 6. "We try to arrange things so that everyone knows not only his job but the jobs in the area as well. The 'old-timers' do the key job, helping to break in the younger people, showing them how things are done—what you might call the tricks of the trade."

Mixing skills

Leone says that by doing things this way—having a mix of young and old, and getting people skilled in more than one job—a lot of flexibility results.

One of those "old-timers," Bill Yunger, is assistant Plant 6 manager on the A-6. The approach is the same, whether it's the A-6 family or the F-14. And so, basically, is the workflow — pre-joining, joining systems installation, systems checkout, engine run, and paint. But there are program differences, and one is that there is no pre-joining or joining effort when A-6As are modified to become A-6Es.

Of great aid in production is the DITMCO (an apparatus for checking out the wiring and circuitry systems), which is employed on all aircraft built in Plant 6. According to Fred Gazzola of Avionics Installation, "The DITMCO check, including running the programmed tape, takes about three days. The check is to see that all wiring is OK for acceptance of the black boxes. To do this, one wire is checked against all of the others for possible shorts. A wire can be chafed or something like that and run to ground. These accidental shorts can be disabling. . . ."

Those who remember the Lunar Module program in the clean room in

Photos by Dick Sander

Plant 5 will see something a bit reminiscent: a "rollover" fixture. It can hold an entire F-14 (minus wings) and rotate it, for the same reason the LM fixture was created: to "shake out" foreign material. Bill Swamback reports that "After a couple of hours of rotation, you can be sure you have a 'clean' plane. It's another one of those extra precautions we take to guarantee quality." So the fixture has performed well in its preventive role.

Production rates (within limits) can vary, but Vin Valetutti, assistant manager of Plant 6 for F-14, says that "now the pace has picked up and we're busy throughout the plant. A way to gauge what happens is to see how long the job is from beginning to end. All of that is charted so we know whether we're hitting the milestones. If you read this chart you can see the workflow, the number of days for joining, for DITMCO, for systems installation, for rollover, for major installation, and for flight control checkout. Flow times vary with the specific program—and program urgency. For example, right now one new production A-6E and four mod aircraft (A-6A to A-6E) go down the line each month."

Lots of planning

All of this is inside the hangar, but part of the Plant 6 workflow is really done outside. First there's the engine-run task, managed by Emil Albertuzzi; and the last job, painting, done by Otto Pook's men. Then the aircraft move to Plant 7 for flight testing.

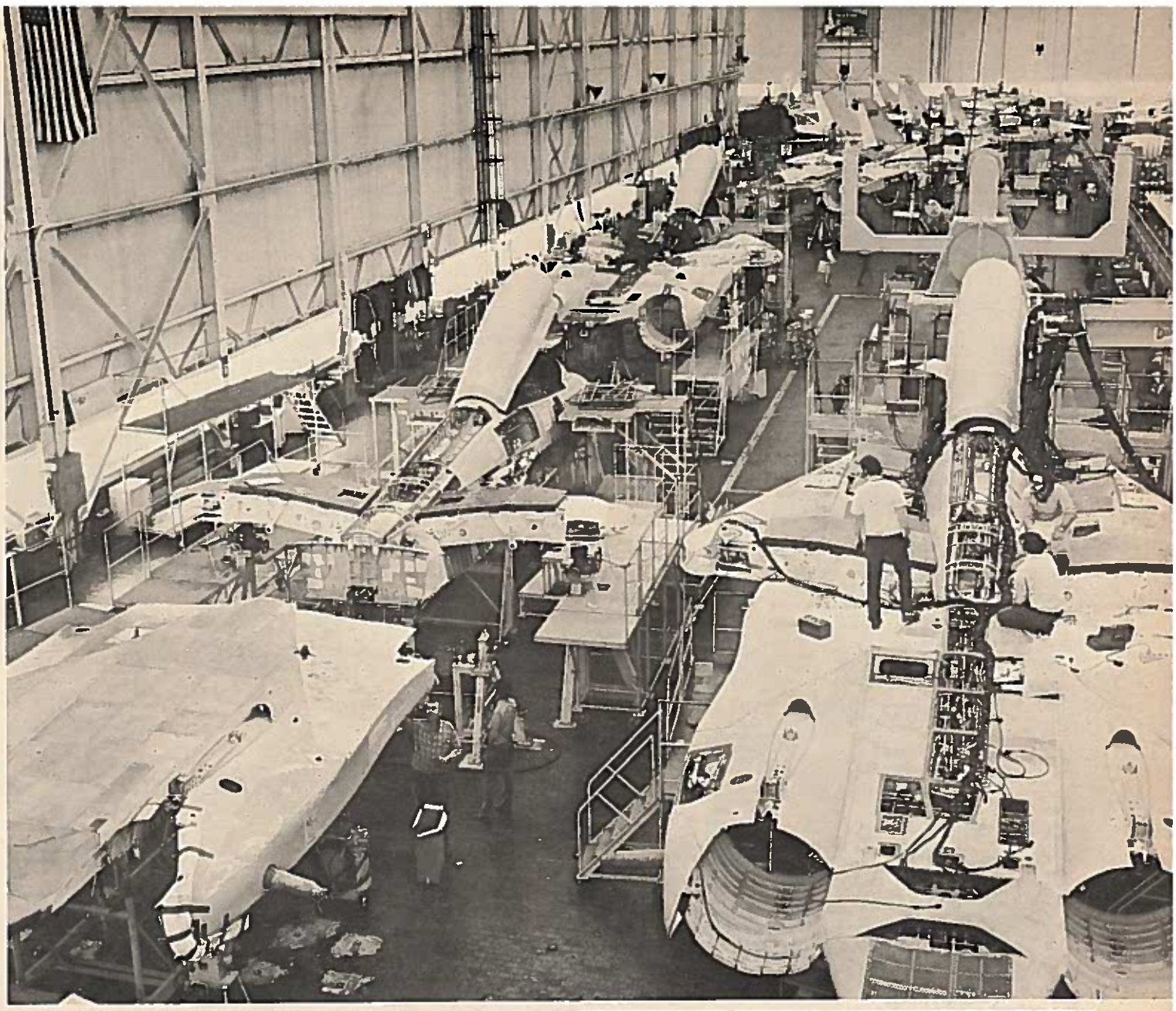
"To get the whole job done as it should be done takes a lot of planning," says Leone, "so a planner is on staff for each of the major workflow areas, joining, installation, and so on. But the real control is down the line, with the foremen and the lead men. They're the people on top of each portion of the production work. They're the people responsible and they're in charge.

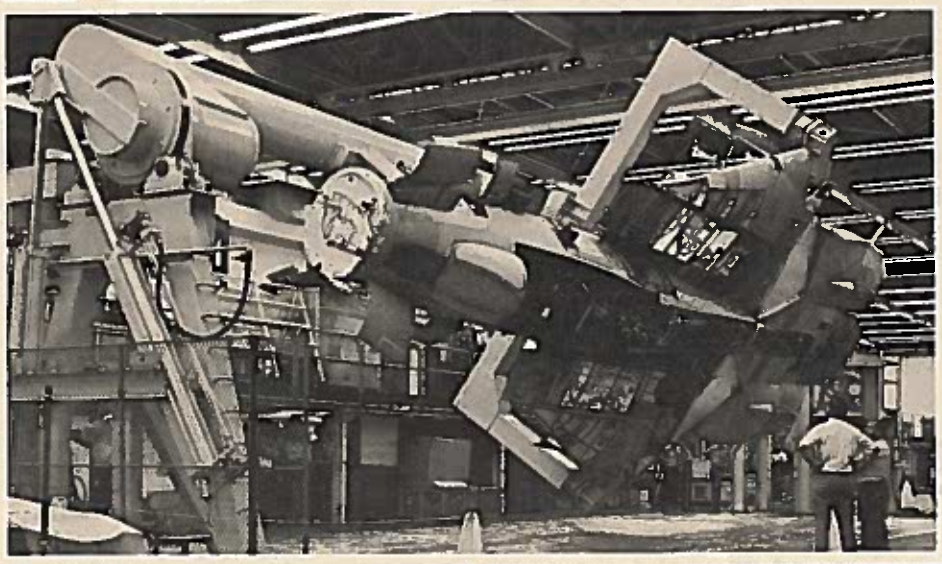
"The idea is to get as far down the ladder as possible because that's where the work is being done. The smaller the unit of work-supervision, the easier —the firmer—the control.

"And control, too," said Leone, "is exercised for quality, and here probably no two people are more important than Sam 'Slats' Salantri of Inspection and Ed Butler of Navy Quality Control."

Also, as Butler points out, "By getting to where the work is, you have stronger lines of communication and better rapport. That seems to improve morale, too, because the people on the line feel that they're more important. And they are. Once they feel that they are being recognized for their job a lot of them respond by making suggestions that simplify processes or cut costs. That's good, for them and the Company."

Butler, Wiercinski, Leone, Yunger, and Valetutti believe that this system of decentralization will pay off, handsomely.





Photos by Bob Settles

Now in its third year, Grumman Ecosystems is taking a hard look at the basis for its origin and redirecting its thrust toward the $15-billion-a-year pollution control market. In an interview with Plane News, Executive Vice President Bill Schwendler discusses Ecosystems growth in terms of the past, present and . . . especially . . . the future.

Ecosystems:

Charting a New Course

Ecosystems has been referred to as a company looking for its personality. Would you explain this and the origin of the comment?

Several years ago, the basic objectives for Ecosystems were put together as an amalgamation of environmental studies being planned by Aerospace's operations analysis department and advanced remote sensing techniques which were of interest to Product Development. An effective combination of these two thrusts appeared attractive enough to begin Ecosystems. We selected the name because it refers to the relationship of an organism with its environment. During the past year and a half, though, we have been looking closely at the basis for Ecosystems' beginning and at redefining its purpose. Our initial start in remote sensing and environmental analysis work is going to be very helpful in our future endeavors, but it does not offer as many opportunities for profitable growth as we had first thought. Consequently, over the past year we have substantially accelerated our orientation toward the design and construction aspects of the pollution control field. For example, our environmental consulting department is now emphasizing work for utility companies which is an initial step toward opening doors for design and construction work in that field. We are currently restructuring our mapping work toward engineering-types of mapping so it will be helpful in other design and construction projects. But while we are doing this we really expect that the greatest volume of our business will come from pollution control facilities.

How large are the principal markets Ecosystems is now engaged in?

One, of course, is the mapping market which we estimate to be about $75 million a year for exploration and resource mapping, and some $200 million a year for photogrammetric and diagrammetric services. While some segments are relatively flat, others are growing at about 10 to 12 percent a year.

Another market is pollution control which, depending on how you define the market, may range from $5 to $15 billion a year and is growing by about eight percent a year. In selected areas the growth rate is higher than this; the package waste-treatment-plant portion of this market alone is growing by some 15 to 20 percent a year. One example is the installation of packaged sewage plants in Suffolk County on Long Island where the market growth may be as high as 30 to 50 percent a year. We feel we have had a fortuitous combination of timing, market research, and qualified personnel to be able to enter this market at this time.

What has been Ecosystems' growth since its formation three years ago?

In 1970, our first year, our sales totaled about $100,000 and were split about evenly between environmental and mapping work. The next year we did about $800,000 and in 1972, we did $1½ million. In 1972, though, construction work accounted for about one-third of the total sales. This year, we expect our sales will be well over $5 million, 80 percent of which will be in design and construction and the rest in environmental and mapping work.

This year, for the first time, we are forecasting a modest profit for Ecosystems. We hope in 1974 to be able to double the business we do in 1973 and thereafter, it is hard to say. The larger you get, and Ecosystems is growing rapidly, the harder it is to apply the same kinds of growth increments as you did when your firm was small and just starting out.

What steps have you taken to penetrate the pollution control market?

One of the first things we did was to separate the construction portion of our business from our consulting work by forming a subsidiary—Puritech Industries, Inc.—last May. And we found Cliff Jessberger, who has years of experience in the field, to run it. As things now stand, this group is working on contracts for the construction of seven sewage plants, all for developers. One of them is in Pennsylvania where the effluent standards are even higher than they are in Suffolk County.

In addition, we have recently acquired two other

companies: Scientific Ecology, Inc., and Power-Pac Enterprises, Inc., both of which are specialists in solid and air waste treatment. Scientific Ecology is primarily concerned with the design and construction of waste treatment facilities for municipalities, industrial companies, hospitails, and apartment buildings. Power-Pac, on the other hand, manufactures a series of refractory incinerator chimneys and rubbish chutes which are sold independently or adapted to Scientific Ecology projects. Ed Sargent of Scientific Ecology and Jack Schmidt of Power-Pac both have substantial experience in this area. All told, our three subsidiaries now give us the capabilities we need for all three of the major pollution control areas: air, water, and solid wastes. Most of the sales efforts for Scientific Ecology and Power-Pac are handled by some 60 manufacturers representatives, located primarily in the eastern U.S.

What is the extent of Scientific Ecology's work, both now and for the future?

Scientific Ecology now has two Corps of Engineers' incinerator jobs, one in Virginia and one in Seneca, N. Y. It is also installing new scrubbers on one of Fort Lauderdale's municipal incinerators, and it is doing some hospital work for the Health, Education and Welfare Department in Georgia and for the St. Francis Clinic in Newark, N. J. It also has a variety of other projects along the East Coast and it plans to do more construction and operating work in the future.

One project that will soon be coming up for rebid is an interesting job in Rochester, N. Y., for which we would supply equipment for two garbage shredding installations for the County of Monroe. In addition to providing equipment, we would also supervise the installation and operate the shredding facility for two years under contract.

What is Scientific Ecology doing for Long Island?

We expect Scientific Ecology to become a major factor in solid waste treatment locally. We are now planning a series of discussions with local officials to see if Scientific Ecology can help solve any of their solid waste and re-cycling problems. We have also done some environmental impact assessments on Long Island, one of which was for the Corps of Engineers in Port Jefferson Harbor to help determine the best way to bring increased quantities of fuel oil onto Long Island. We are also doing environmental assessment work for the Long Island Lighting Company regarding one of its power-line interties across Long Island Sound. The New York Atomic and Space Development Authority has us under contract for a Phase A study of the environmental considerations pertinent to siting an offshore nuclear power plant in the New York area. Partial Phase B funding has been committed locally, and we are currently in the process of obtaining the balance from the Atomic Energy Commission.

What is a municipal job and what potential does it offer Ecosystems?

These are the big contracts which include the whole waste treatment package, ranging from sewer lines to treatment plants. Some contracts may be as small as $500,000, while others may be as big as $50 million. The Southwest Sewer District on Long Island, for example, estimates some $250 to $300 million in construction over the next three years, a major part of which goes into sewer lines, interceptors and the like. Our interests, though, are in constructing the waste treatment plants themselves, and preferably on a "turn-key" contract basis—that is, those contracts in which one company is responsible for the design as well as construction of a project. Aerospace contracts are typically "turn-key" contracts even though they aren't called that. It would be unusual in Aerospace for one company to get the design contract for an airplane while another got the contract for manufacturing it, but that is the way most sewage plants are built. We have found that there is actually more opportunity for turn-key work in the solid waste treatment area due to a less-established contracting history on the part of municipalities.

What is meant by the statment that you can be a large company without becoming a major factor in the pollution control industry?

For comparison, consider some of our major mapping jobs in which there are a handful of major companies around which have been in business longer than we, and which have contracts in many countries. When a job comes up, they know about it and the competition gets keen. With only a limited number of jobs around, it would be difficult to become a large company in this field.

In the pollution control field, on the other hand, there are many more awards or contracts so you can be more selective about jobs you go after and how tight your pricing has to be. We have more latitude to pick jobs that are right for us so we don't have to go after a high percentage of all the jobs. Thus, we can become a large company without necessarily becoming the major factor in a particular area.

Are there any geographical limitations to the work Ecosystems does?

We believe in providing good on-site management for these jobs to insure that they meet specifications, are done properly, and on time. Our ability to apply that kind of management, though, is a function of "job size" and "distance." For example, it would be difficult to apply the right kind of management and be price competitive on a small job that is several thousand miles away. On the other hand, when you are dealing with say, a $10 or $20 million project, then it is more economical to cover a large distance and still be competitive. As we go along, we intend to gradually expand our geographical coverage.

What is the correlation between the waste treatment work Ecosystems does and the waste treatment system now being developed by Grumman's Advanced Civil Systems group?

Historically, most waste treatment systems utilize various types of biological processes which take sewage and aerate it by introducing oxygen so the sewage serves as food for bacteria that break down the waste into less hazardous materials for discharge into the ground or streams. If chemicals are inadvertently added, though, the chemicals may kill the bacteria and the process may be lost.

There has been a lot of work in recent years on "physical-chemical" processes, such as the Ozotherm system now being developed by Advanced Civil Systems. It appears to have a very good potential and we are interested in selling the system through our manufacturer-representatives network. However, we are a commercial organization and we won't try to sell the system until it is proven for fear of jeopardizing our own credibility.

What have been some of your major mapping projects?

Our largest contracts have been for natural resource exploration. During our Greenland project in 1971, we covered close to 45,000 line miles of data for the Greenarctic Consortium. We even covered parts of Greenland that had never been mapped before. In Peru, which is another poorly mapped area, we covered 135,000 square miles with sidelooking radar data and about 30,000 line miles with highly accurate magnetometer data. These are very substantial projects, but we are also trying to build up our local mapping capabilities. For instance, we have recently done several projects for the Corps of Engineers, we have been awarded a mapping contract by the Long Island Lighting Company and we are doing a natural gas exploration project in western Virginia. We also plan to build up our force of "backroom" people who put together data into map form for analyses.

What is sidelooking radar and how does it give Ecosystems an edge over competitors?

As the name implies, it is used to look out the side of any airplane, lay down an image parallel to the

(Continued on page 10)

Bill Schwendler Jr.

When you ask Bill Schwendler Jr. about the objectives of Grumman Ecosystems—the Grumman Corporation subsidiary of which he is executive vice president—he swings slowly around in his blue desk chair, opens the top drawer of the adjoining credenza and takes out a small white business-size card on which is printed:

"We're not in business only to advance the profession, we're in business to make money."

"Clint Towl gave me that several years ago and I have tried not to forget it," he says.

The advice is proving right for Ecosystems which is one of the rapidly growing pockets of Grumman today. Schwendler, who has been with the corporation for 13 years—six as a summer student-employee and seven as a fulltime employee—discusses in a recent interview with Plane News the status of Ecosystems today, how it has grown and where it is going.

Schwendler holds a A.B. degree in economics from Princeton University and has an MBA from Harvard Business School. During his summer employment with Grumman, he worked in various production assignments, in equipment and process engineering, E-2 program management and in business development. One summer, he worked at the First National City Bank in New York City. In 1966, he joined Grumman fulltime in the contracts department and in January, 1969, helped form the then-new corporate development group which was set up

Photo by Fred Annette

to analyze acquisitions and make recommendations on new business ventures for Grumman.

"When a proposal came along to build a remote sensing airplane," he points out, "it looked as if there might be some opportunity to develop a new business around it."

Not long after that Grumman Aerospace Vice Chairman, and then Senior Vice President (also Ecosystems' President) Bill Zarkowsky tapped Schwendler and Tom Attridge (now Vice President of Operations) to help establish Ecosystems.

The rest of Ecosystems growth and development is told by Schwendler in this article.

service milestones

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Allan T. Towl, Jr., Grumman Corp.
Harry Kummerfeldt, Fuse Fwd. Sub & Major (1)
Richard Landry, Tanks & Ducts (2)
George J. Quarry, Dispatching (2)
Dominick Agiesta, Insp-Tooling (11)
Joseph J. Vormittag, Dispatching (24)
Donald R. Towne, Sub-Assembly (27)
Barney C. Charvat, Repair Control (27)
Charles L. Meyer, P/S A/C Systems Service (79)
William Kuhn, Prototype (1)

30

Henry C. Schirmer, Final Assembly (1)
Wilfred G. Frerk, Alodine (2)
Charles W. Motzer, Details Pts/Tool Fab. Mgmt. (2)
Edgerton C. Wolfert, Details Pts/Tool Fab. Mgmt. (2)
Patsy Bernardo, M. E. Mgmt. & Staff (2)
Walter Kowalsky, Honeycomb Bonding (3)
James J. Cribbins, Prod. Release & Analysis (3)
Charles E. King, Repair Control (3)
Stephen Focardi, Mech. Struct. & Proto. (5)
Ladislaus W. Hanak, Hydraulics (6)
Francis W. Hamel, Power Plant (6)
Frederick C. Bergmann, Jr., B/P Warehouse (17)
Anthony Friscia, Ship & Spares Consolid. (17)
Walter Foray, Trans-Operations (20)
Charles A. Fehn, Inventory Control (21)
Paul Luchynsky, Mfg. Test Plts. Mgmt & Staff (27)
Minnie D. Kordula, Invoice Audit (30)
Carl R. Johnson, E-2C Wings (77)

25

Dominic Saccone, Prototype (1)
Frank R. Curcio, Sub-Assembly Major (1)
Victor J. Sanc, Jr., PPO - F-14 (1)
Joseph G. Engstrand, Jr., Controls and Mechanisms (1)
Robert L. Roemer, Prog. Engg. Mgr. (1)
Robert W. Von der Linn, Insp-Tooling (1)
William C. Martin, Heat Treat (2)
Alfred T. Ricco, Spotweld (2)
Bernardino Leone, Wing Inner Panel & Combo (2)
Harold W. Lockwood, Hydraulics (2)
Hans W. Gudeman, Jigs & Fixtures (2)
Theodore W. Wiegardt, Jr., Machine Shop (2)
John L. Rucky, Templates (2)
William Guga, Templates (2)
William J. Corrigan, Jig Details & Sub-Assy. (2)
James R. Shedden, Marshalling & Finish Tool Cont. (2)
Eric H. Bjork, Assy. Tooling & Handling Equip. (2)
John M. Zockoff, Optical Tool & Metrology (2)

Inspection team. **Navy recruiting officials were at Grumman recently to inspect prototype of Recruitmobile being produced by Grumman Health Systems for the U.S. Navy. Shown during inspection are Carmine Lagnese, GHS program manager; Al Coccio, NAVPRO; Cdr. Bruce Newell; Ladd Valusek, Naval Facilities Engg.; Capt. George Goetzke; Angelo Bellisimo, NAVPRO; Norm Reinertsen, GHS; Chief Richard Murray.**

John D. Woodworth, Conventional Machines (3)
Edward Ryan, Honeycomb Prep. (3)
Marco H. De Marcki, Honeycomb Final (3)
Alvin H. Kirschberg, Mfg. Test, Mgmt. & Staff (3)
Frank J. Powell, Prod. Ctl-Parts Ctl. (3)
Harold J. Ress, GSE Mechanical (5)
Bruce N. Tuttle, Corp. Serv. Mgmt. & Staff (5)
Celia Boland, Food Service (5)
Eugene J. Toscano, Aero Test (5)
John A. Whipple, Jr., Adv. Aircraft System (5)
Ronald D. Spencer, Bus. Dev. (5)
Sherman B. Carll, Power Plant (6)
George F. Neyssen, Preflight Finals/Sus. Install. (6)
Alfred R. Stevens, Mfg. Test. Mgmt. & Staff (6)
Robert Partlow, Maint-Rearrange. (6)
Frederick Piercey, Maint-Rearrange. (6)
Anthony M. De Nardo, Insp-Electronics (6)
Robert Finck, Preflight Finals/Sys. Install (7)
George Petrilak, Prod. Ctl-Parts Ctl. (7)
Jack Buffa, Insp-Mechanical (7)
Morris Raff, Meas. Stand. Lab (12)
Edward E. McMullen, F-14 Mfg/Functional Mgmt/Staff (15)
Arthur L. Howell, Fiberglass (27)
John Castelluccio, Fuselage Joining (27)
Louis Li Causi, Product Control-Parts Control (27)
Walter C. Brenner, Requirements Planning (30)
Stanley F. David, Invoice Audit (30)
Francis P. Fitch, Plann.-Out of Plt. Support (34)
Robert G. Hughes, P/S A/C Systems Service (34)
Frank J. Moley, B/P Warehouse (35)
Richard A. Scheuing, asst. director, Research (35)
Edward J. Arola, Production (88)

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John A. Adornato, PPO - F-14 (1)
Irving T. Waaland, Aerosynamics Staff (1)
William H. Ackerman, Jr., Mission & Sys. Analysis (1)
Lillian Forbes, Prod. Mfg.-Mgmt. & Staff (2)
Aladar J. Push, Maint.-Facil. Equip. & Gen. (2)
Ralph D. Scarborough, Conventional Machines (3)
Joseph J. Berlino, Instr. A/C Test (5)
Leonard E. Ormaner, Insp-Electronics (5)
George A. Nohejl, Preflight Finals/System Install. (6)
Henry J. Mellor, Meas. Stand Lab (6)
William Allen, Flight Avionics (8)
Harold Dunayer, P/S Provisioning Req. (15)
Robert L. Thompson, Rocket Propulsion (25)
Robert Monosko, Mission & Sys. Analysis (25)
Charles Keenan, Power Generation & Conversion (25)
Gerard Suda, Facilities (30)
Charles A. Guarneri, Environ. Control Des. (35)
Charles H. Buxton, Sr., Paymaster (40)
Walter L. Harper, Fiance & Admin. (77)
Mark T. Guss, Grumman Corp.
Helena I. Wilenski, Grumman Ecosystems

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Alan P. Frost, Sub-Assembly (1)
Robert W. Prais, Project Manager (1)
Lester J. Grey, Mfg. Test, Mgmt. & Staff (1)
Peter O. Crocco, Maint.-Rearrangement (1)
Roy R. Handwerk, Alighting Gear/Armament-Pyrotech Sys. (1)
John Calandra, Crew Systems (1)
John J. Carroll, Configuration Data Mgmt. (1)
Donald A. Maynard, Form Block ,(2)
Clarence J. Heagney, Dispatching (2)
Oscar H. Schaefer, Optical Tool & Metrology (2)
Melvin Paiken, P/S Servo Trng. Deb. Engg. (2)
Charles H. Vernon, Maint-Rearangement (2)
Chester K. Edmund, Maint-Facil. Equip. & Gen. (2)
Frank A. Fodera, N/C Machines (3)
Edward P. Anusewski, N/C Machines (3)
Charles M. Poitras, N/C Machines (3)
Michael Shaffron, Mach. Oper-Parts Ctl. (3)
Robert O'Keeffe, Assy. Tooling & Handling Equip. (3)
Arthur K. Marquardt, Maint-Rearangement (3)
Leroy E. Van Cott, Vehicle Prod. Eng'g. (3)
Frank R. Czapanskiy, Air. Traf. & Radio Comm. (4)
Alois L. Gross, Conventional Machines (5)
Lawrence J. Engel, Mech. Struct. & Proto. (5)
George H. Hammelman, Jr., Environmental Control & Test (5)
Robert S. Keiser, Support Proposals & Estimates (5)
Gaspar L. Sala, Grd. Test Inst. (5)
Frank W. Wisekal, Contracts A/C (5)
Richard L. Bolton, Spl. Progs. & Promotion (5)
Richard A. Rate, P/S Verif. & Prod. Supp. (6)
Hamilton W. Stiles, Jr., Flying Qualities (7)
Walter E. Herr, Proj. Plan (7)
Peter S. Kraus, Q. C. Lab. (10)
Joseph V. Trippodi, Mechanical (14)
Donald F. Dumermuth, P/S Tech Services (15)
Abraham A. Zier, Structural Design (15)
Nicholas J. Peluso, Trans-Operations (20)
Charles Sellitz, P/S Electrical Engg. (25)
Herbert H. Fishkin, Structural Design (25)
James J. Williams, Proj. Engg. Systems Tech. (25)
Peter J. Daly, Proj. Plan (25)
Paul Grinoch, Nuclear & Astro Physics (26)
Joseph F. McDonald, Jr., Center Section-Sub-Assembly (27)
George V. Judge, Jr., Vehicle Prod. Eng'g. (27)
Michael T. Leogrande, Maint. Admin. (30)
Karl R. Herrnkind, General Acct. (30)
John Keene, P/S RF & Video Engineering (34)
Lawrence J. Moran, Guidance & Navy Sys. Des. & Anal. (34)
Judith B. Davis, Info. Rec. & Serv. (35)
William Wolkowitz, Advanced Development (35)
Paul R. Waisanen, Prof. Develop. Program. (39)
Wallace Grindrod, MSC. Mfg. Shops (52)
Michael P. Voiland, Technical Ops (77)
Charles P. Farrell, Production (80)
Theophilos F. Tartas, Base Management (80)
David J. Baxter, Engineering (88)

Happy 25th

D. Saccone | F. R. Curcio | V. J. Sanc, Jr. | J. G. Engstrand Jr.

R. L. Roemer | R. W. Vander Linn | W. C. Martin | B. Leone

H. W. Lockwood | H. W. Gudeman | T. W. Wiegardt Jr. | J. L. Rucky

W. Guga | J. R. Shedden | E. H. Bjork | J. M. Zockoff

S. F. David | F. P. Fitch | R. G. Hughes

F. J. Maley | R. A. Scheuing | E. J. Arola

J. D. Woodworth | E. Ryan | M. H. De Marcki | A. H. Kirschberg

F. J. Powell | H. J. Ross | B. N. Tuttle | E. J. Toscano

J. A. Whipple Jr. | S. B. Carll | G. F. Neyssen | A. R. Stevens

R. Partlow | F. Piercey | A. M. DeNardo | R. Finck

G. Petrilak | J. Buffa | M. Raff | E. E. McMullen

A. L. Howell | J. Castelluccio | L. LiCausi | W. C. Brenner

For Sale

MISC. FURN.: Meditern. dng. rm. set, parquet tp., solid oak, 2 leaves, tbl. pads, 4 chrs., velvet cush., wrought iron chandelier inc., 212-737-6812, after 6 p.m.

VW BUS: '70 7-pass., blue w/blk. int., sunroof, am/fm, 59,000 mi., $1,700. 586-5860.

BARRACUDA: '68, 340cid., 4 spd. trans., posi-rr., tach/gauges, am radio, rr. window defog., fold. rear, p/s, dk. green, blk. int., $800. 587-2233.

BOAT: 14 ft. plywd./fbgl. runabout, $60; gas tanks, 6 gal. 'cruise-a-day' w/hose, 2 for $25. 271-7909, evgs. or wkends.

OFFICE FURN.: Desks, chairs, file cabinets, etc. 731-4861.

TV: 18 in. color port., 2 yrs. old. 423-3596.

TV: Color TV, 21 in., am/fm stereo phono, new pict. tube, walnut fin., $350. 681-9588.

FISH TANK: 25 gal. w/stand, all access., $35. MO 5-3319 after 4 p.m.

BUNGALOW: Ferndale, N. Y., 2 bedrm., full bath, kitch., screen. porch, fully furn., all util., 40x100, priv. lake. PY 6-3887, after 6 p.m.

HOUSE: Sayville, colonial, 4 bedrm., liv. rm., din. rm., den, eat-in kitch., w/w, full basemt., gar. 567-0543.

BOAT: '71 International, 17-ft. bowridder, 60 hp. Evinrude elect., fully equip., used 60 hrs., w/trail., $2,800. 798-7563.

DINETTE SET: Spanish, wrought iron, ped. chairs, red/black, oct. tbl. w/one leaf, wd. grain, formica, $95. 979-8376.

ACCORDIAN: ACM (Ital.), 120 bass keybd., best offer. PE 1-1386.

CHEVROLET: '65 BelAir, wagon, 6 cyl. auto., snow tires/rims. 427-0921.

HOUSE: Immed. occup., 7 rm split level, 3 bdrm., panel den, s/s, att. gar., oil heat, low taxes, $26,000. 289-3757.

MISC.: English circu. slide rule, $20; G. E. 18 cu. ft. freez., $200; Norge 10 cu. ft. refrig., $75; Sears Kenmore wash machine motor & timer, $15; antique satin drapes, dbl. width, $20; triple width, $30; old col. drop leaf table, $15: Evgs. 921-3192.

For Sale

HOUSE: 3 bdrm. split level, lndscpd. 1/3 acre lot, lvg. rm. w/ bow window, dng. rm., kit. w/ 2 appl., bath, fin. fam. rm., laundry rm, bsmt, gar., $34,900. 587-9657.

CAMARO: '67 red/blk vinyl, 327, auto., all power, exhaust, shocks, 2 new tires, bucket, console, 31,000 mi., orig. owner, $1200. 248-0680.

BICYCLES: Girl's 20 in. Schwinn, $15; boy's 20 in. polo Rollfast, $18; girls 26 in., $20. WE 5-4148.

MISC.: 35 ft. wooden ladder, $15; I.V.W. am radio, $10 WE 5-4148.

VIOLA: Ger. hand-made ¾ size w/case & access. (bow, strings, pitch pipe, rosen, sheet music), $80. 643-9366.

PROPERTY: 38 acres, upstate N.Y., stream, waterfall. After 6 pm. 751-8872.

For Sale

PROPERTY: Hi-elevation, 10 acres, long rd. frontage, 1,244 ft. x 350 ft., gravel rd., 3 mi. to town, near Finger Lake, 230 mi. from N.Y.C. HA 1-3722.

BOAT: '72 19 ft. Winner Tri-Hull, full canvas, bow rider, 18 ga. fuel tank, 100 hp Evinrude w/ controls, certified trail. & ex., $3500. 928-2076.

CAR RADIO: Universal AM pushbutton w/ speak. & VW antenna, $20. 751-1256.

ELEC. OVEN: 30 in. Norge, 4 burner top, $40. Evgs. 367-4118.

BED FRAMES: Adjustable, 2 sets, $9 ea., $15 (2) sets. 735-5261.

SAILBOAT: Sunflower, 11 ft. unsinkable Corlite, 55 sq. ft. sail, $165. After 5. 692-2878.

SADDLE: English riding, forward seat. 667-0495.

For Sale

HOUSE: Oakdale, 4 bdrm., 2½ baths, den w/fireplace, professionally landscaped, many extras. $47,500. 516 567-0551.

PONT: '68 Catalina, 2-dr. hd. top, 36,000 mi., r/h, all power, air. cond., vinyl, $995. 581-6237.

TANKS: (5) 10 gal. s/s. undergravel filter glass chips, meter frame heater. thermo., glass rocks, plants in each, $15 ea. LR 5-2886.

HOUSE: Ridge, custom 6 rm. brick ranch, lvg. rm. w/ fireplace, 3-bdrm, pan. dng. rm., eat-in-kit w/ dw, true Centre Hall, ceramic tiled 1½ bath, s/s, full bsmt, OHW 2 zone heat, oversize gar., lge. patio, pvte. lake rights, 100 ft. x 100 ft., $31,500. 929-6651.

BOAT: 14 ft. Mirro-craft alum., 25 hp Evinrude, tee-ne trl., tank, oars, anchor-mint cond., $650. 271-6735.

BOAT: 2 ft Thompson '62, 75 hp Evinrude, sleeps 2, head, full canvas & cushions, elec. start & shift, bilge pump, ex. $1,250. 669-6625.

COUCHES: (2) foam rubber, wood frame, matt., & bolsters, rust color covers, both $50. Or sing. CH 9-1019.

CYLINDER HEADS: Pontiac, '63 and up "389" eng., compl. rebuilt, new springs, surface ground. AN 5-9508.

MISC.: (2) Rambler steel 15 in. wheels, (1) mens bowling ball. 735-5261.

HYDROPLANE: 8½ ft. length, wood construction w/ fbgls. seams, holds up to 15 hp eng., $65. 775-9001.

FORD LTD.: '68 Country Squire wagon, V-8, all power, fac. air. cond., 10 pass, stereo tape deck, new brakes, new muffler system. $1350. 775-9001.

RECORDS: Old class. RCA 78, over 150 discs, some only one sided. $50 for all. TU 8-5548.

CHEVELLE: '70 Super Sport, 29,000 mi., 4-spd., all power, posi-tract, bucket, 396-350 eng., gold w/ blk. stripes, bal. of warranty, $1800. After 5 pm. 666-7841.

CORVETTE: '65, blue w/ blk int., 365 hp/327 cu.in., posi-trac., two tops, 54,000 mi., $1300. Before 8:30 pm. 226-3398.

at your SERVICE

This is a free service to Grumman personnel for non-commercial advertisements, accepted on a first-come, first-served basis. Classified advertisements are carried in PLANE NEWS only on the basis that everyone replying to such advertising will receive fair and equal consideration regardless of their race, creed, color, or national origin.
Type or print ad on form available at Employees Service and Engineering counters, and send via interplant mail to PLANE NEWS, Plant 5, Bethpage. List home phone (with area code if outside Nassau or Suffolk). Limit: one ad per person per issue. No item under $10, no firearms or ammunition.

MISC.: Table saw 12 in. for firewood, 2-man hand saw, lawn sweep, ping pong table, man's 3-spd. bike, outdoor Kerosene lamps, 20 in. reel power mower w/ aerator attach., Clemson hand mower, elec. mixer, man. meat slicer, 4 lamp movies light bar. 751-3814.

FOREIGN TIRES: (2), 570-14, w/w, 1 yr, both for $20. PY 8-2424.

HONDA: Motor bike, '70, never used, $400. After 5 pm. AN 1-8260.

BOAT: Chris Craft, 25 ft., sleeps 4, eng. rebuilt, repaint., head, sink, etc. Ask. $3000. 585-5567.

MISC.: Sectional sofa, gilden brown, recently covered, $150; bunk beds, no matt., $50; whte. single size padd. hdbd., $10; Amer. Flyer train set, $40; fenders, '28-'29 Ford, $25 ea. 265-2762.

Ecosystems' New Course

(Continued from page 7)

flight path of an aircraft, and record radar imagery that looks like photos with topographical and other land features highlighted by radar impulses at relatively flat angles. Only two companies besides ourselves have sidelooking radar. One local application is for natural gas exploration in western Virginia where the data will be used to find fault and fracture zones to help understand the pressures that formed portions of the Appalachian Mountains.

Is Ecosystems sophisticated technology and equipment an offshoot of space and military technology?

More from military than space. Our radar is almost identical to that installed on the OV-1 Mohawk which Grumman Aerospace built for the Army. Both magnetometer systems we use—the ASQ-81 and ASQ-10A, were developed for military purposes but modified for geophysical purposes. Space technology, of course, has been very helpful in leading to some innovations in the pollution control field. But waste-handling systems for only a few astronauts at a time is an entirely different matter than that of a municipal waste handling system which might involve several hundred thousand people. Still, there are some control and monitoring systems developed for space applications that may also be applicable in this field.

Is Ecosystems aiming to create or introduce technological innovations or advances?

We're trying to make a profit with Ecosystems. Sometimes you find that the way to make money is to help advance the profession, but we aren't necessarily interested in being first. We do Research and Development work at this time, and it may be several years before we can actually afford to do research that we fund ourselves.We do have cooperative programs with some of our customers in which we tackle a problem together, but it is always directed toward solving a particular problem.

We also license some processes involving particularly unique equipment which we can utilize in our projects. One example is a licensing agreement between Scientific Ecology and Cecchini, S.A., an Italian firm with a very good solid waste recycyling capability. They have several plants in operation, the largest of which handles the wastes from a city of 100,000 people. The system segregates paper for resale as pulp to a cardboard company, it segregates metal and glass for resale, and it cooks the remaining organic materials for use as animal feed pellets.

How is Ecosystems organized?

Starting at the top, Vice President Bill Malloy is in charge of our environmental and mapping division; Cliff Jessberger is Vice-President in charge of Puritech; Ed Sargent is President of Scientific Ecology and is in charge of that operation as well as Power-Pac. At the same time, Jack Schmidt runs Power-Pac. Joe Missbach is Director of Contracts and Purchasing and Ray Montano is Controller. They and their staffs provide support services to all three of our operating divisions so we have in each group a small professional staff backed in financial matters by people who work at our headquarters. Tom Attridge is Ecosystems' Vice President in charge of operations, George Scheuerlein is in charge of our mapping programs department and Doug Hill heads our environmental program department.

What are Ecosystems most unique qualities or capabilities?

Since we deal primarily in servicing customers, our people are really our most important factor. Qualifications are important in whatever we do, be it design, consulting advice, flying, interpretation, field supervision, or estimating. To help our business grow, we will need increasingly more able personnel to provide the regional capabilities.

We also believe in good management. We try our utmost to deliver what we promise, which is sometimes unique in the construction field. Our developer clients, for example, have substantial funds tied up on construction and have to meet certain obligations to rent or sell apartments or condominiums. If they can't count on the contractor to do his part of the job well and on time, they may not get a certificate of occupancy and then would be unable to rent or sell the property.

Relative to our competition, we have better financial strength in spite of the problems caused by the F-14 program's difficulties. In addition, we expect to be able to use many elements of Grumman's capabilities as we expand the size of the jobs we do. For example, Grumman's background in control systems and cryogenics should prove helpful in future projects.

Summing up, what directions do you think Ecosystems will take in the future?

The major portion of our business will continue to come from the design and construction of pollution control facilities. We plan to expand our design capabilities in the industrial waste area and we will continue to expand our efforts in solid and air waste treatment.

In the environmental area, there is a continuing and expanding market for us in providing our environmental assessment capabilities to government agencies and to private industry. The utilities, particularly the power utilities, are faced with some difficult problems and we can help solve some of them. In mapping, we are putting more emphasis on interpretive services, computer-coordinated mapping and photogrammetric work.

For Sale

MISC.: EMC mod. 213 tube tested. new, $25; maple dress., 5 dr., $30; '61 Childcraft 15 vol., $55; FM stereo ant., ch. mast. 4408-G, repaired, $15. 543-2423.

SAILBOAT: Grumman alum., 14 ft., dacron sail, 2 pc. mast, cox trailer, used 4 times, $450. AN 5-5118, wkends only.

DATSUN: '70, 240Z, $3,750. 549-8007.

BEDRM. SET: 5 pc., dbl. bed, dress., lg. mirr., chest, night tbl., antiq. gold, $150. 294-8209.

PICK-UP TRUCK: '65 Ford, ½ ton, 6 cyl. std. shift, $850. 271-9097.

SKIS: Head 720, 198 cm., $35. IV 9-0013.

CHEVY: '65 Station wagon, 6 cyl., auto. trans., white, new shocks/start. motor/ball joints, 70,-000 mi., nds. minor eng. work, ask. $300 or best offer. 292-1086.

BOAT: '68 Silver line, 16 ft., glass, 50 Merc., elect. start, gages, full canvas, trail., seats 6, always gar., xtras., $1,250. 694-3395.

BUICK: '68 Electra 225, 2 dr. hdtp., charcoal w/ white vinyl tp./inter., a/c, posi-tract., p/s, p/b, rr. spkr., speed alert, $1,400. 751-0890.

CUTLASS: '61 parts, carb., gen., starter, etc., 587-3877.

HOUSE: Farmingdale village, colonial, 3 bedrms., new eat-in kitch., fin. basemt. gar., form. din. rm., liv. rm., front sun rm., screen. patio, ohw heat, walkup attic, nr. trans., school district. 22, low taxes, $35,500. CH 9-9313, after 4 p.m.

OUTBD. MOTOR: 7½ hp. '72 Sears, ask. $160. WA 2-6853 after 4 p.m

SNOWBLOWER: Ariens, heavy duty, 6 hp eng, $195. 757-2141.

CALENDAR of events

Notice of events for period Apr. 12-26 should reach Plane News by **Wednesday, Apr. 4.**

Amateur Radio Club: Wed., March 21 at 5 pm, WA21QO radio shack on roof Plant 5, local, busi. & oper., open to outsiders. Emmett Goodman, WA2JFA, Ext. 87125.

Coin Club: Every Wed., 12:05 pm, Plt. 25 vendor con. rm, informal lunchtime meet. Ken Hale, Ext. 1936.

Flying Club: Second Fri. each mo., Plt. 28, guests welcome. Betty Schledorm, Ext. 7372.

Instrument Society of America: Wed., March 28 at 7:30 pm, LILCO Northport power station, guests welcome. Rich Romaneck, Ext. 2275.

Stamp Club (Bethpage): First & 3rd Wed. month, 5 pm, Plt. 30 cafe, circuit book sales, swap, auction, gen. discuss, new members & guests welcome. E. Manaker, Ext. 3513.

Soccer Club: March 25, Grumman vs Freeport at Grumman; April 1, Grumman vs Jamaica Port at Jamaica; May 12, Grumman vs West Point at West Point. Karl Herrnkind, Ext. 3470.

OBITUARIES

Plane News has received word that death has come to the Grumman personnel listed below. We extend sincere sympathy to relatives and friends.

GEORGE L. LINDQUIST of Product Support, Plant 15, died March 13 at the age of 48. He had been with Grumman 10 years and lived at 545 Peter Paul Drive, West Islip.

ARTHUR T. IMMEL of Machine Operations, Plant 3, died March 18 at the age of 56. He lived at 49 Clover Ave., Floral Park, and had been with Grumman over nine years.

FRANKLIN E. HONSBERGER JR. died March 19 at age 45. He worked in Requirements Planning, Plant 30. Honsberger joined the Company in 1964 and lived at 157 Sherry St., E. Islip.

DAVID A. MURPHY of Machine Operations, Plant 3, died March 19 at 57 years of age. He had been with Grumman since 1961 and lived at 2391 Central Ave., Baldwin.

For Sale

TRAILER: '66 Apache Eagle Camper, sleeps 4 adults, bunks, full canopy, spare tire, $300. 567-1016 after 6 p.m.

MUSTANG: '69 green w/blk. vinyl tp., 6 cyl. auto., r&h, p/s, new brks/shks., stud. snows on rims, 41,000 mi., $1,100. 543-1068.

CHEVELLE: '68, auto., r&h, new snows, 46,000 mi., 6 cyl., nds. body work, ask. $325. Bob, PY 6-5960.

DRAFT. FURN.: Tbl. 5 ft., never used, pedestal tape, anco mfg.; draft. stool, wd.; Dazor lamp w/2 bulbs; 48-in. straight edge, compl. set $75. CH 9-3005 after 7 p.m.

HOUSE: West Babylon, Cape Cod, legal 1½ (mother-daught.), 9 spac. rms., 4 rm. basemt., 2 baths, 3 compl. kitch. w/priv. entr., carpet, gar, lg shed, landscpd grnds, fenced, $40,000. MO 1-0355.

DATSUN: 240Z, '72, 4 spd. stick, am/fm. foglights, cust. slipcovers, radial snows on rims, stereo tape, $3,900. 273-6213.

POOL: 15 x 4 ft., dismantled, filter, cover, vac., alum. ladd., etc., $75. RO 6-1572.

TRAILER: '56 Friendship, 13 ft., sleeps 4. new 2 burner gas stove, elec. brks., new tires, hitch, mirr., $450. 473-4576.

MOBILE HOME: Rollo-home, 12x55, stays in park on prop., 2 bedrms., home carpet., $7,500, furn. or unfurn., 598-1804, after 6 p.m.

FALCON: '65 4 dr.. std., 6 cyl., nds. paint, $250. 234-1923.

TRAILER: '71 Lancer, 17 ft., fully self-cont., sleeps 6, hitch, brk. control, mirr., spare tires, awning, $2,400. 888-4662, after 4:30 p.m.

FURN.: Din. rm. set, 9 pc., $350; liv. rm, sofa, $35; charis, tbl., bookcase, kitch. & bedrm. pieces, rugs, a/c, desks, etc.; 10 spd. Schwin Varsity bike, $50. 328-7032.

GOLF CLUBS: New McGregor Jack Nicklaus "Golden Bear," 10 irons, 3 woods, McGregor bag, complete $110. 266-1497.

HOUSE: N. Wyandach, Sch. Distr. 5, ½ acre, wd. plot, center hall, liv. rm.. din. rm. w/baywind., kitch. eat-in, w/w, wash/dryer, s/s, 16-36 grnd pool fenced, patio, fulll basemt., 643-8755 after 6 p.m.

DOG HOUSE: Port. galvan. 20x10 ft., 6 ft. high dog run and house for lg. dog, $250. 584-5714.

TRUCK: '68 Ford pick-up, ¾ ton, $1,300. OV 1-7815 after 5 p.m.

MINI-BIKE: Bonanza, 4 hp. 2 seat., chrome clutch cover, jack shaft, 15 in. wheels, $105. 884-8625 after 5 p.m.

HOUSE: Bethpage Estates, hi-ranch, 3-5 bedrms., centr. a/c, prof. land., s/s, w/w, d/w, 1½ baths, 1 car gar., Florida patio, ohw ref., w/d. fenced, fam. rm., laundry rm., $59,000. 938-6140.

ACCORDIAN: 120 Bass, black, case, $250. AN 5-9625.

PUPPIES: Basset hound, AKC., champion sired, tri-color, red and whites, whelp Feb. 21. WE 5-7770.

HOUSE: Bellmore North, 4 bedrms., 2 baths, din. rm., eat-in kitch., full bsmt., gar., sprinkler syst., many xtras., $42,000. 785-1292.

HOUSE: Hauppauge, ranch 7 rms, 2 baths, den w/ fireplace, 2 car gar., bsmft, corner lot ½ acre, trees, ingrnd pool, stockade fence, 2 patios, sun-deck, exp. attic, s/s, w/w, dbl ovens, refrig./wash./ dishwash., furniture, nr. Vet's Hwy., LIE., $54,000, direct sale. 234-0289.

ENGINE: Chrysler Crown, 6 cyl, 1.5 to 1 reduction gear, fresh water cooled, $150. After 5 p.m. 277-3630.

IMPALA: '72 Custom, blue, black vinyl, AC, all power, new snow tires, 350 cu. in. Evgs. 549-9697.

BOAT: American Finn, 22 ft. h/t Volvo Penta I/O, many ex., $1500. 586-1653.

POOL TABLE: 4 ft. x 8 ft., 1 pc. slate, $400; snow blower, AMF, best offer. 921-0865.

MISC.: Maple table & 4 captains chairs, $75; 1 fireplace screen & 1 pr. antique & irons, all for $15. 878-1767.

CHEVY: '68 Suburban carryall, std. trans, V-8, 3 seats, $1350. AN 5-2679.

EQUIPMENT: Radio control, Kraft w/ small servo's, two senior Falcons & 1 Cherokee aircraft. 588-5779.

BIKE: Columbia, coaster brakes, girls 26 in, $25. After 5 p.m. MY 4-5091.

HOUSE: Selden, 3 bdrm., 1½ bath, pan den, lge. kit, w/w, fenced, appli., maintenance-free exterior, ½ bsmt. Treed $29,500. After 6 p.m. 732-5954.

CERAMIC MOLDS: Lge. & small, select from many mold co's. AV 1-2337.

EQUIP.: Craftsman 10-in. table saw, roll-away stand & 2 table extensions, $125 Delta 11 in. drill press, bench mod., no motor, $45. 931-3089.

For Sale

VIOLIN: Full size. access., $40. MY 4-5091.

A-H SPRITE: '67 1275 cc, rebuilt eng., new clutch, brakes, upholstery, roof, muff., r/h, lugg. rack, $725. PY 8-4258.

OUTBD.: 55 hp Johnson elec., less than 50 hr., dealer winterized, $500. After 2:30 p.m. 669-2345.

BOAT: '68 duo-tri hull 68 Johnson, trail., all equip., $750. TU 4-1549.

MISC.: 48 in. extt. Maple colon. tbl. w/2 leaves, 4 mate chrs., $50; 5 light chandelier alabaster, $20; stereo, am/fm, phono, tv in contemp. walnut cons., $145. R. Bruno, Ext. 84446.

HOUSE: Brooklyn, between R&H and Haring St., 7 room caldor type, attached brick 2 room basemt. rent. apartment, community drive, gar., $50,000, must sell to sette estate, inspection by appt. only. 433-4898.

AUSTIN AMERICA: '71 auto. trans., am/fm, vinly tp., 19,500 mi., $1,450. B. Kovit Ext. 9342.

FALCON: '64 Econoline bus, $475. CH 9-1045 after 5 p.m.

MISC.: Ital. prov. 6 ft. stereo cab., $125; 3x100 ft. fence wire, $25; 7½ ft. sofa, $50; 4 wd. chrs., $15. 588-6364.

STEREO EQUIP.: Heathkit AD 27 fm receiver w/30 watt amp., BSR turntable, shure cart. w/new stylus, $85; 2 Heath 12 in. spkrs. in walnut cab., $75; all for $150. 731-3764.

CUTLASS: '63, auto. trans., floor shift, muck seats, $75. Call Carl Brodt, Ext. 1251.

CATAMARAN: Hobbie cat 14, two seasons, trail., regatta blue hulls, light blue vinyl coat, nylon trampoline, $1,000. 757-7818 after 6 p.m.

PROPERTY: Delhi, N. Y., riverfront, 15 acre, 300 ft. on Delaware River, wooded, walk to golf, 1½ mi. to number route, 2 mi. outside of town, terms avail. n $8,500. MO 1-3868.

RANGE: G.E. elect. 40 in., $50 duct hood., s/s w. fan & filter, 40 in., $25. 785-5331.

BOAT: '69 Sportcraft fbgl cabin cruiser, 27 ft., twin 160 hp Mercruisers, pwr. tilt, depth finder, sniffer, am radio, synchr., deluxe interior, ice box, din., rec. stove/sink, fresh water tank, marine head & hold. tank, bow and stern rails, sleeps 4 outrigg., etc. $7,000. 421-5589.

HOUSE: Commack, colonial, brick/wd. cedar front, 8 rms., 4 bedrms., lg. eat-in kitch. sep. din. rm., 2½ baths, 2 car gar., lg. patio, full bsmt., ¼ acre, corner lot, lndscpd., w/w, s/s, bsbd. heating, wash., dryer, dishwash., $44,000. 543-0895.

CAMARO: '68, 302 ci.d., 4 spd., posi-tract., 4 barr. holler carb., high rise manifold-cam-head, r&h, mags, 2 new tires. 997-9873 after 4 p.m.

OVEN: 40 in. white GE 4-burner range, 3 storage drawers, $50. 293-8896.

CHINA CLOSET: Antiq., solid round. gl., mirr. back, gl. shelves, lock/key, inside light. carved lion heads, $265. 757-2406.

BURGLAR ALARM: Compl. solid-state home syst., new, never opened, control panel, alarm bell, magnet. switches, wire, instruct., $48. 935-6322.

RANGE: 30 in. Coppertone, ask. $75. 666-6725.

OUTBD. MOTOR: 10 hp, '69 Evinrude, $290. 265-1187.

DATSUN: '69 model, 510. 4-dr., 34,000 mi., ex. snows & rims, $885. 878-2676.

CUDA: '67, air. cond., new brakes & alt., reasonable. 473-8460.

HOUSE: Smithtown, col., 6½ yr., 3 bdrm., 1½ bath, den, formal dng. rm., eat-in-kit, elec. appl. OHW heat, ¼ acre nr. school & shopp, $41,500. 724-2756.

VW: '71 Superbeetle, blue int, auto stick, rear def., radio, snows, ask. $1450. After 6 p.m. 589-8481.

CADILLAC: '70 Sedan de Ville, low mi., extras. Evgs. SU 5-4296.

FORD: '70 Bronco, red, 6 cyl, 4 wh. drive, free wheeling hubs, 3 spd. std., r/h, remove. top, new Goodyear wide ovals, $2000. 242-1432.

CASSETTE: Panasonic tape recorder, AC & batt. w/ micro., radio cord, aux. input jack, 10 record cassettes, $20. 781-8653.

FREEZER: Upright, 18 cu. ft., United "Harvest Queen" commercial, $200. 928-1043.

WAGON: '65, 9 pass., small V-8, auto., $700. 669-8537.

BOAT: '67 Thunderbird, 15½ ft. Tri-Hull fbgls, 68 Evinrude, 65 hp, elec. start, 67 little dude trail, navy top, side curtains, $1300. After 5 pm OR 6-0651.

HOUSE: No. Massapequa, 4 bdrm., col. split, lge. kit., dng. rm., lvg. rm, 1½ bath, walkin foyer, patio, one car gar., extended gar., den, bsmt., $42,000, 75 ft. x 100 ft. After 3 p.m. MY 4-6044.

Can you help?

Four families are seeking furnished rental houses or apartments for six months beginning May 1.

Pratt & Whitney Aircraft now has 11 representatives assigned to Grumman Aerospace Corporation to support the F-14 and other programs. Starting in April, additional engineers will be stationed at Calverton to assist in the flight testing of the F-401 engine in the F-14B.

Anyone who has or knows of temporary rentals should contact R. Van Overschelde, Pratt & Whitney Site Manager, Plant 1, Extension 2546, as soon as possible.

For Sale

HOUSE: Sayville, 6 rm., cedar ranch, 28 ft. panelled kit. w/ atta. dng. rm., new dual entr., full bsmt., bath, gar., ½ acre fenced, patio, tool shed, compl. redecor., prime area, ex, conventional only, $33,500. 567-1965.

SNOW TIRES: (2) Sears, dynaglass, F78-14 w/ '70 Mercury Wheels, $40. 271-0898.

STEREO RECEIVER: Sansui mod. 3000A, 130 watts IHF, 48/48 Watts rm., $125. HA 7-5550.

GO CART: Blue & blk, seat, 2 eng, 3 hp ea., (1) new eng., $160. IN 1-9125.

RAFT: 2 man rubber boat, pump, oars, unused patch kit, $20. After 5 pm. 692-7878.

LUGG. RACK: Triumph TR-4A sports, $15. B. Kovit, Ext. 9342.

HOUSE: So. Great River, farm-ranch, 9 rm., 5 bdrm, 3 baths, den, firepl., full bsmt., 12 yrs., ¾ acre near water, possible mother/dght., $57,500. After 6:30 pm. JU 1-4707.

SAILBOAT: 22½ ft. Pearson Electra, fbgl., jib, genoa, spinnnaker, 6 hp outbd., sleeps 4. 822-5472.

Personals

Those of you public spirited citizens who are now or who have been members of any school board in Nassau and Suffolk counties are invited to contact B. R. Schmitz, Ext. 87429 for the purpose of getting together some evening for a discussion of the problem of high school taxes and coming up with concrete proposals to put the brakes on these costs.

plane GRUMMAN news

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Last chance for pin squad

Grumman picked up a couple of hundred pins on A.M.F. in the third round of the L.I. Industrial Men's Bowling Tournament at Mid Isle Lanes last Saturday night, but there's still 267 sticks separating the 1-2 teams in the 16-squad field—and that's a lot of wood to cut in one three-game session.

Can it be done? Perhaps, but it would take a *super* effort by the Grumman five—and a less-than-average output by A.M.F.

A.M.F. looked as thought it would run away with the title after two rounds—it led by nearly 500 pins—but in the third session the leaders slumped, and badly, with a 2,646 total. Grumman, with Buzz Goodman hitting 206-225-596 and Ed Hilbert contribuing 201-582, reached 2,866 for the three games. Other Grumman scores included Jack Nielsen's 554, George Ulrich's 223-579, and captain John Alston's 555. A.M.F. leads Grumman, 8,530-8,263, for nine games. The team title will go to the industrial squad that collects the most pins for 12 games.

If you're a pin addict, stop in at Mid Isle Lanes on Peninsula Boulevard in Hempstead—it's just off Southern State Parkway—and give the Grumman guys a lift. It may help. The action starts Saturday at 8 p.m.

Tee party

What better way to end a work "day" than by playing a round of golf? No better way, thinks Bob Terry of Plant 2, who's recruiting linksmen (or linkswomen) for his Bethpage Nite Owl golf league. If you're interested, give Bob a call on Ext. 84236 or 84245, or contact George Rocchio in Plant 5, Ext. 2441.

And by the way, Mike Cherry of GAA reminds Grumman golfers that the greens fee at Bethpage State Park for weekday leagues is $4. After 5 p.m., that fee is reduced to $3.

Tom Cats rally earns hoop win

In the Thursday night basketball league, the Tom Cats were cellar dwellers; not one win to brighten the season, until the last game which was against the Druids. The score was tied 72-72 with two seconds showing on the clock as Joe Sousa went storming down the court and made a lay-up to give the Tom Cats something to talk about until next season. Sousa was high scorer with 20 points, with fine support from Tom Schifini, who had 14 points. Rodger Carpenter, the mainstay on defense, had 24 rebounds and six blocked shots.

Finishing up the season undefeated, the Newcomers squeezed by the Digits, 63-61. Eddie Krol led the way for the winner's with 22 points. Doug Kueling and Billy Foote chipped in 18 and 13 points respectively. The Newcomers and the Digits will face each other in the league play-offs.

Varsity bumped

The Grumman varsity team got bumped out of the first place berth in the Huntington League when the Green Machine came from behind with 30 seconds to go, to win 99-98.

Betterino, Wojtyniak set records at Syosset

John Betterino and Monica Wojtyniak—those are the big names in the Syosset Mixed loop after the two pin spillers threw record-breaking scores a couple of weeks ago. John, a former Grumman varsity performer, shattered George Bunzel's 278 mark by a single pin, then used that 279 and a 216 to climb to 671—another record-breaker, this time his own, by 36 sticks. Monica just missed eclipsing Rita Mathia's 234 standard as she rolled 227 on the way to a record 584.

Mike Leogrande flipped 245-618 to outdistance Herb Pirkl's 215-583 in the Red loop, while later, Phil Musa's 242-619 and Bill Hettinger's 206-222-603 were high. . . . Bob Herz fired 268—11 sticks shy of Jake Brouillard's standard—to pace Masters play in action marked by Nick Malandro's 818, Ray Zeller's 237-805, John Betterino's 805, and Ike Washington's 794. . . . Ann Wuestmann's 540 and Chet Everoski's 218-577 headlined Hawkeye Mixed action, and in the Century Mixed, B. Kallansrude's 587, Ruth Fino's 493, and Walt Bruckert's 549 were tops.

High flyers in the Black league included Jim Richter and Joe Russo who put together 238-221-639 and 203-232-622, respectively. Other bright spots were Bill Burkhardt's 252 — that's more than 100 sticks over his average—Irv Austin, 201-202-232-635; Vic Matuza, 219-605; Pete Katalo, 227-604; and Jim Herzberg, 231-595. . . . Dave Struller's 558 *just* outdistanced Joan Burgess's 552 in the Patchogue Mixed circuit, while Larry Orlando shot a hefty 204-225-627 to lead Classified scoring.

Frank Nelson got back in the scoring chase at Oscar's while hitting 203-257-640, tying the high-game mark in the Trader loop, while Steve Kish fired 242-599 and Ken Smith, 214-580. . . . Bonnie Auer finally hit it big with 452 in the Blue Mixed, but Joyce Olenick and Leslie Coursen topped that with 497 and 463, respectively.

Slow-pitch sessions

Softball season is nearly here. Here is the meeting schedule for team representatives who plan to compete in Grumman lunch-period softball leagues this season.

PLANT 1: Wednesday, Apr. 4, 11:50 a.m., GAA, Pl. 30.
PLANT 2: (First lunch) Tuesday, Apr. 3, 11:50 a.m., GAA, Pl. 30; (Second lunch) 12:30 p.m. at GAA.
PLANT 3: Wednesday, Apr. 4, 12:30 p.m., GAA, Pl. 30.
PLANT 5: Monday, Apr. 2, 12:30 p.m., GAA, Pl. 30.
CALVERTON: Thursday, Apr. 5, 11:30 a.m., Pl. 6 Training area.
PLANT 27: Monday, Apr. 9, 10:15 a.m., cafeteria.

And the after-hour league meeting schedule:

MONDAY: Apr. 23, 5 p.m., Plant 28 auditorium.
TUESDAY: Apr. 24, 5 p.m., Plant 28
WEDNESDAY: Apr. 25, 5 p.m. Plant 28
THURSDAY: Apr. 26, 5 p.m., Plant 28

Opening day for lunch-time leagues is May 14, after-hours, May 21.

Net tourney to open Apr. 14

For those who plan to enter the third annual GAA tennis tourney, here's a promise from tourney director Mitch Rosenbaum: this year's tournament *will not* be a six-month marathon like last year's. And remember, that's a promise.

Contestants must arrange for courts and pay court fees, according to Chet Baumgartner of GAA, and it is suggested that, whenever possible, matches be played on clay courts. GAA will supply tennis balls, court fees for semi-final and final matches, and trophies for first- and second-place winners.

And varsity tennis coach Mitch Rosenbaum reminds all his former players that the tourney will be one of the bases of selecting team members again this year—so you'd better sign up. Competition starts Saturday, April 14.

Al Kirillin and Tom Guarino did last year—and wound up champs of the doubles competition. So did Dick Kline—and he collected top singles honors.

Remember, the tournament is open to all Grumman employees—and that means women as well as men. So fill out the accompanying form and mail it to Baumgartner in GAA, Plant 30. The entry deadline: Friday, April 6.

GRUMMAN AEROSPACE CORPORATION
BETHPAGE, NEW YORK 11714

BULK RATE
THIRD CLASS
PERMIT NO. 264
U.S. POSTAGE PAID
BETHPAGE, NEW YORK

Tennis tourney entry

Singles

Name ..... Perm. No. .....

Plant ..... Dept. ..... Phone Ext. .....

Home Address ..... Phone .....

Doubles

Partner's Name ..... Perm. No. .....

Plant ..... Dept. ..... Phone Ext. .....

Home Address ..... Phone .....

Entry Deadline Friday, April 6
(Forward to GAA Office, Plant 30)